Vol. 10. Part 7. Pp. 115–130. 15th July, 1941

THE PROCEEDINGS

OF THE

ROYAL ENTOMOLOGICAL SOCIETY OF LONDON

Series B.
TAXONOMY

(being the continuation of Stylops)

World List abbreviation: *Proc. R. ent. Soc. Lond.* (B)

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LONDON:

PUBLISHED BY THE SOCIETY AND

SOLD AT ITS ROOMS, 41, QUEEN'S GATE, S.W.7

Price 3s. 0d.

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   Mr. W. Fassnidge, appointed 1934.
6. **Royal Meteorological Society. Phenological Committee.**
   Dr. C. B. Williams, appointed 1937.

BRITISH APHIDIDAE. 1. THE GENUS *PENTATRICHOPUS* BÖRNER (HEMIPTERA)

PART 2.

By I. Thomas and F. H. Jacob.

Pentatrichopus potentillae (Walker 1850) (figs. 2c, 6, 7).

1850, *Aphis potentillae* Walker, F., *Ann. Mag. nat. Hist.* (2) **6** : 122.
1913, *Macrosiphum potentillae*, Theobald, F. V., *J. econ. Biol.* **8** : 150.
1926, *Capitophorus potentillae*, Theobald, F. V., *Aphid. Great Britain* **1** : 225–256.
1932, *Pentatrichopus potentillae*, Börner, C., *in* Sorauer : *Handb. d. PflanzenK.*, 4th ed., **5** (2): 619.
1933, *Pentatrichopus potentillae*, Lambers, D. H. Ris, *Stylops* **2** : 173.
1940, *Pentatrichopus potentillae*, Thomas, I., and Jacob, F. H., *Ann. appl. Biol.* **27** : 234–247.

Apterous viviparous female.—Colour of living specimen : Head and body pale yellow. Eyes very dark red, almost black. Antennae translucent at base, slightly dusky from middle of III to the end. Cauda like body. Cornicles long, thin and translucent. Coxae like body, femora and tibiae translucent, latter slightly dusky, tarsi almost black. Ventral surface pale yellow, tip of rostrum almost black.

Macerated specimen : Body oval, body hairs moderately long and capitate, averaging 0·05 mm. The dorsal integument is characteristically wrinkled, these wrinkles and the

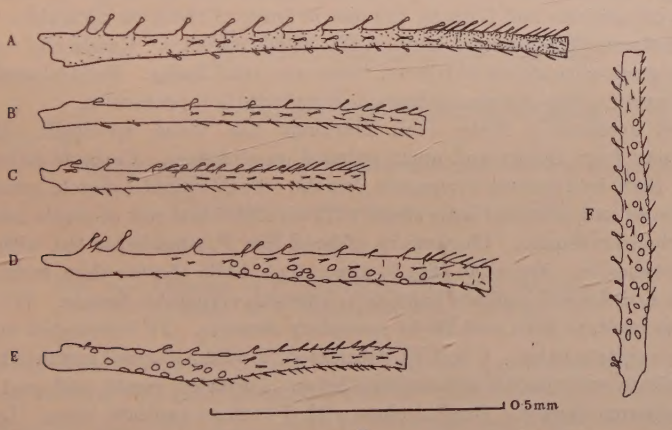

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Fig. 5.—A, B and C, hind tibiae of apt. viv. ♀♀ of *P. potentillae* Wlk., *P. fragariae* Theob., and *P. tetrarhodus* Wlk. respectively. D, E and F, hind tibiae of ovip. ♀♀ of *P. potentillae* Wlk., *P. fragariae* Theob. and *P. tetrarhodus* Wlk. respectively.

hair-bearing tubercles give the body a rugged appearance. Except on the pronotum, the spinal tubercles each bear two approximately equal capitate hairs. The pleural and marginal hairs generally occur singly but additional hairs between the pleural and marginal rows are found from the 2nd thoracic to the 4th abdominal segment. Head with frontal tubercles well developed. Head nodules present and extending on to antennal segment I. Rostrum reaches just beyond 2nd coxae. Antennae (fig. 6) a little shorter than body with no secondary sensoria. I with a forward and inwardly projecting protuberance, also one

small pointed hair near the base and 5 short capitate hairs. II smooth with 4 short capitate hairs. III smooth proximally, imbricated distally, with 7–15 fairly prominent spathulate or capitate hairs, the longest of which is at least equal to diameter of IV. V with about 4 short capitate hairs. VI with 2 spathulate hairs on base. IV, V and VI imbricated. Cornicles long, thin and strongly imbricated over almost the whole length. Imbrications also present immediately behind the cornicles on abdominal segments 6, 7 and 8. Cauda spiny in appearance, very slightly constricted basally, rather blunt, with 5 long non-capitate hairs, two lateral pairs and a single dorsal sub-apical hair. Anal plate with about 8 long non-capitate hairs. Genital plate difficult to distinguish and with about 9 capitate hairs. Legs: Coxae imbricated with spathulate or capitate hairs. Trochanter generally with at least one long capitate hair. Femora with about 10 capitate hairs, longest equal to about $\frac{1}{2}$ diameter of femur. Tibiae with about 10 conspicuous capitate hairs along one side, mostly on proximal half, longest about equal to about $\frac{1}{2}$ diameter of tibia, many normal and spathulate hairs present distally. Tarsi normal, first tarsal joints with 5 hairs.

Measurements of one specimen: Length of body (including cauda) 1·92 mm., breadth of body 0·92 mm., antenna 1·75 mm., cornicle 0·46 mm., cauda 0·17 mm., width of head 0·34 mm., average length of body hairs 0·05 mm., antennal segments $\frac{0{\cdot}10}{\text{I}}$; $\frac{0{\cdot}09}{\text{II}}$; $\frac{0{\cdot}44}{\text{III}}$; $\frac{0{\cdot}28}{\text{IV}}$; $\frac{0{\cdot}28}{\text{V}}$; $\frac{0{\cdot}13+0{\cdot}41}{\text{VI}}$. Secondary sensoria absent.

Alate viviparous female.—Colour of living specimen: General ground-colour pale green. Head black. Thorax with meso- and metathoracic lobes black, pronotum dusky. Abdomen with variable dusky to black patches which include the pleural tubercles laterally; isolated bands on first and second abdominal segments, bands on 3–5 coalesce to form a single dark patch, those on 6, 7 and 8 coalescing to a variable degree. Dusky patches around base of cornicles and 3 dusky patches in front of them on each side. Eyes very dark red. Antennae black except base on III, which is dusky. Cauda and cornicles pale green. Legs green with apices of femora, tibiae and tarsi dusky. Ventral surface (except thorax) pale green. Tip of rostrum black. Wing venation prominent.

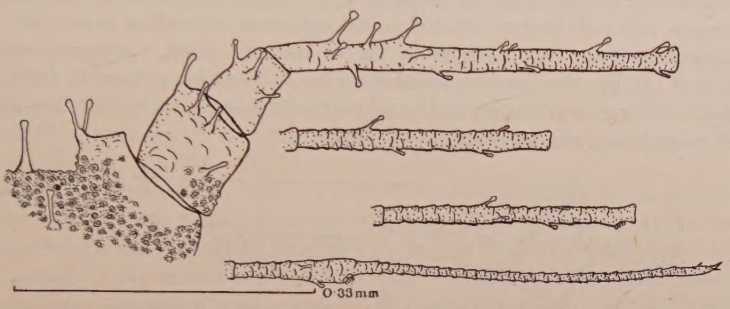
Macerated specimen: Body oval, markings like living specimen. Hair-bearing tubercles absent from thorax and much reduced on abdomen. Capitate hairs much less conspicuous than in apterous viviparous female. Each spinal tubercle generally bears 2 hairs. Pleural and marginal hairs single with an additional row of single hairs as in the apterous viviparous female. Chaetotaxy of head like *P. tetrarhodus* but with 2 hairs on each frontal tubercle. Antennae (fig. 7) generally a little shorter than body. I and II smooth, with nodules and capitate hairs as in apterous viviparous female. III with 5 or 6 inconspicuous capitate hairs and 26–41 secondary sensoria. IV imbricated and with 2–6 small weakly capitate hairs. V and VI imbricated, V with 3–5 small capitate hairs and VI with one capitate and about 2 non-capitate hairs. Cornicles, cauda, and anal plate as in apterous viviparous female. Genital plate with 7–9 short capitate hairs. Legs: Coxae imbricated with a small number of inconspicuous non-capitate hairs. Trochanters with at least one short capitate hair. Femora and tibiae with a small number of short inconspicuous hairs. Tarsi normal. Wing venation normal.

Measurements of one specimen: Length of body (including cauda) 2·11 mm., breadth of body 0·97 mm., antenna 2·28 mm., cornicles 0·45 mm., cauda 0·17 mm., wing span 6·6 mm., antennal segments $\frac{0{\cdot}11}{\text{I}}$; $\frac{0{\cdot}09}{\text{II}}$; $\frac{0{\cdot}61}{\text{III}}$; $\frac{0{\cdot}41}{\text{IV}}$; $\frac{0{\cdot}36}{\text{V}}$; $\frac{0{\cdot}16+0{\cdot}54}{\text{VI}}$ mm. Secondary sensoria on III, 31 and 32.

Fundatrix.—Colour of living specimen: General colour very pale green. Antennae darker than body, tip of V and VI dusky. Eyes very dark red, almost black. Legs and cornicles pale, semitranslucent except for tarsi, which are dusky.

Macerated specimen: Less rugged in appearance than apterous viviparous female

owing to greater size and slightly shorter body hairs. Chaetotaxy very like the apterous viviparous female except that the spinal tubercles from the 2nd thoracic to the 6th abdominal segment each bears 3 capitate hairs. The additional hair is on a small tubercle joined on to the large spinal tubercle laterally. Head nodules present and extending on to basal segment of antenna. Antenna considerably shorter than body. I with nodules and about 4 short capitate hairs, II smooth with 3 capitate hairs, III with basal half smooth, remainder imbricated with at least 2 capitate hairs as long as diameter of III. IV imbricated with 2–3 short capitate hairs. V and VI imbricated, V with at least 2 capitate hairs. Cornicles, cauda, anal plate and legs as in apterous viviparous female.



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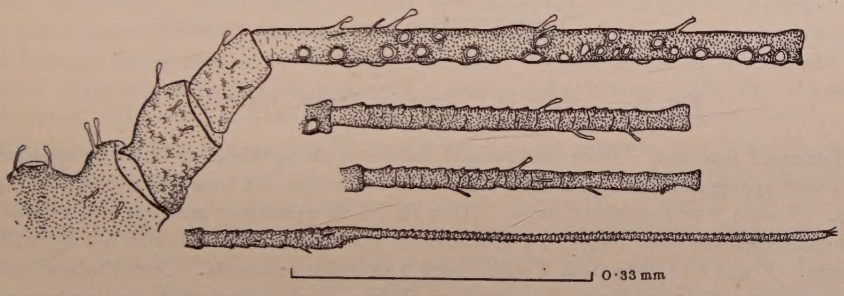

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Fig. 6.—Antenna of *P. potentillae* Wlk., apt. viv. ♀.
Fig. 7.—Antenna of *P. potentillae* Wlk., alate viv. ♀.

Measurements of one specimen : Length of body (including cauda) 2·14 mm., breadth of body 1·05 mm., antenna 1·67 mm., cornicles 0·45 mm., cauda 0·16 mm., average length of body hairs 0·045 mm., antennal segments $\frac{0{\cdot}11}{\text{I}}$; $\frac{0{\cdot}08}{\text{II}}$; $\frac{0{\cdot}42}{\text{III}}$; $\frac{0{\cdot}32}{\text{IV}}$; $\frac{0{\cdot}28}{\text{V}}$; $\frac{0{\cdot}13 + 0{\cdot}33}{\text{VI}}$ mm. Secondary sensoria absent.

Oviparous female.—Colour of living specimen : Very like apterous viviparous female but with body rather more yellow. Antennae slightly darker and hind tibia very slightly swollen.

Macerated specimen : Very like apterous viviparous female but with antennae and legs less hairy. Segment I of antenna with 4 or 5 capitate hairs. II with 3 or 4 capitate hairs. III slightly imbricated distally with at least 4 capitate hairs longer than diameter of III. IV, V and VI all slightly imbricated and without capitate hairs. Legs : Coxae without capitate hairs. Hairs on trochanters only weakly capitate. Femora less hairy than other apterous forms with 4–8 capitate hairs. Tibiae on 1st and 2nd thoracic legs with about 3 conspicuous capitate hairs about equal in length to the average diameter of the tibia.

Hind tibiae with about 20–30 pseudosensoria on distal $\frac{2}{3}$ and about 5 conspicuous capitate hairs along one side. Tarsi normal.

Measurements of one specimen : Length of body (including cauda) 1·68 mm., breadth of body 0·90 mm., antenna 1·52 mm., cornicles 0·40 mm., cauda 0·16 mm., average length of body hairs 0·055 mm., antennal segments $\frac{0{\cdot}11}{\text{I}}$; $\frac{0{\cdot}08}{\text{II}}$; $\frac{0{\cdot}35}{\text{III}}$; $\frac{0{\cdot}23}{\text{IV}}$; $\frac{0{\cdot}23}{\text{V}}$; $\frac{0{\cdot}11 + 0{\cdot}41}{\text{VI}}$ mm. Secondary sensoria absent.

Egg.—Size of a single egg : 0·74 × 0·30 mm. Pale at first but turning black later. Laid mainly on the underside of old leaves near the edges.

Apterous male.—Colour of living specimen : Head and body dusky with darker dorsal bands on meso- and metathorax and abdominal segments, extending to and including the pleural tubercles. Eyes very dark red. Tip of rostrum black. Antennal segments I, II, and base of III like the head, remainder darker. Cornicles and cauda light, external genitalia dark. Coxae, trochanters and basal parts of femora light, rest dusky, with tips of femora, tibiae and tarsi almost black.

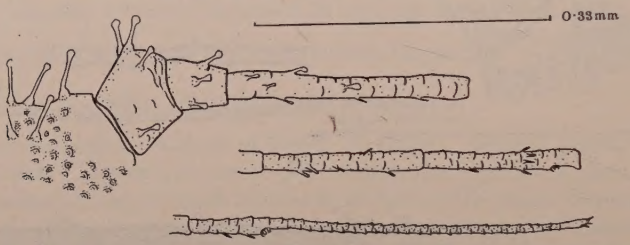

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Fig. 8.—Antenna of *P. fragariae* Theob., apt. viv. ♀.

Macerated specimen : Body narrow and slender with markings as in living specimen. Head with sparse nodules. Antennae : I with a few nodules at base and about 5 capitate hairs. II with 3 or 4 capitate hairs. III with 15–20 secondary sensoria and at least 3 prominent capitate hairs equal to $\frac{3}{4}$ diameter of III. IV imbricated with 6–8 secondary sensoria. V and VI imbricated, V with about 8 secondary sensoria. Cornicles and cauda like apterous viviparous female but smaller. Legs : Coxae imbricated, trochanters each with at least one capitate hair. Femora imbricated distally, with 3 or 4 capitate hairs. First and second tibiae with at least 2, and hind tibiae with at least 3 capitate hairs equal to or greater in length than the average diameter of the tibia. Tarsi normal.

Measurements of one specimen : Length of body (including cauda) 1·48 mm., breadth of body 0·65 mm., antennae 1·74 mm., cornicles 0·38 mm., cauda 0·13 mm., average length of body hairs 0·05 mm., antennal segments $\frac{0{\cdot}10}{\text{I}}$; $\frac{0{\cdot}08}{\text{II}}$; $\frac{0{\cdot}45}{\text{III}}$; $\frac{0{\cdot}30}{\text{IV}}$; $\frac{0{\cdot}27}{\text{V}}$; $\frac{0{\cdot}11 + 0{\cdot}43}{\text{VI}}$ mm. Secondary sensoria ; 15 and 17 on III, 7 and 7 on IV, 8 and 8 on V.

Biology : Lives all the year on *Potentilla anserina* L. It is generally to be found on the undersides of the leaves, showing a preference for the young shoots and leaves. Alatae are not common and occur only towards the end of May and June. Sexuales occur in September and October, the males being particularly difficult to find. Eggs are laid mainly on the undersides and near the margins of the old leaves. The leaves wither and die but the eggs hatch in April, the young larvae seeking out the new year's young growth. The species does not appear to live on any other plant (Thomas and Jacob 1940). It is a widespread species in North Wales and is often fairly abundant near the sea and along roadsides.

Pentatrichopus fragariae (Theobald 1912) (figs. 2b, 8, 9).

1912, *Myzus fragariae*, Theobald, F. V., *Entomologist* **45** : 223–224.
1926, *Capitophorus fragariae*, Theobald, F. V., *Aphid. Great Britain* **1** : 224–246.
1932, *Pentatrichopus fragaefolii* Ckll., Börner, C., *in* Sorauer : *Handb. d. PflanzenK.*, 4th ed., **5** (2) : 619.
1933, *Pentatrichopus potentillae*, Lambers, D. H. Ris, Stylops **2** : 173.
1935, *Capitophorus fragaefolii* Ckll., Balachowsky, A., and Mesnil, L., *Ins. nuisibles plantes cult.* **1** : 440.
1937, *Capitophorus fragariae*, Hodson, *Bull. ent. Res.* **28** : 409–416.
1937, *Capitophorus fragariae*, Massee, A. M., Greenslade, R. A., and Duarte, A. J., *Ann. Rep. E. Malling Res. Stat.* **1937** : 209.
1940, *Pentatrichopus fragariae*, Thomas, I., and Jacob, F. H., *Ann. appl. Biol.* **27** : 234–247.

Apterous viviparous female.—Colour of living specimen : Head and body very pale greenish-yellow, some specimens almost colourless, translucent. Eyes very dark red. Antennal segments I, II and base of III light and translucent, rest dusky. Legs translucent with tips of tibiae and tarsi fairly dark. Cornicles translucent. Cauda and underside of body like rest of body. Tip of rostrum black.

Macerated specimen : Body oval with conspicuously wrinkled dorsal integument and moderately long capitate hairs averaging 0·05 mm. The hair-bearing tubercles give the body a rugged appearance. Spinal tubercles on the 2nd thoracic to 4th abdominal segment generally with 2 hairs; remainder 1 or 2 haired. No additional capitate hairs occur between the pleural and lateral rows. Head with distinct frontal tubercles but not quite as prominent as in *P. potentillae*, each tubercle generally bears one prominent capitate hair (2 in *P. potentillae*). Head sparsely covered with short, very blunt spines or nodules, most numerous around the eyes, extending laterally on to the frontal tubercles but not more than 5 or 6 on the basal joint of the antenna. Antenna (fig. 8) : I with an inward and forwardly projecting protuberance and with 5 short capitate hairs. III, IV, V and VI imbricated. III with 3 to 5 short capitate hairs and a few spathulate hairs generally equal in length to about $\frac{1}{2}$ diameter of III, sometimes a single capitate hair near the base is large and approximately equal to diameter of III. A few non-capitate hairs also present. Generally not more than one short distinctly capitate hair on IV. V and VI each with a few non-capitate hairs. Cornicles slightly curved inwards, imbricated, long, thin and slightly tapering, with imbrications most numerous on the basal half. Cauda conical, spiny and very slightly constricted basally with 5 long hairs, two lateral pairs and a single subapical dorsal one. Anal plate with a small number of long non-capitate hairs on swollen bases. Genital plate spiny with about 7 capitate hairs. Legs : Coxae and trochanters without capitate hairs. Trochanters with 2 non-capitate hairs, one long and one short, the former generally blunt. Femora with very few spathulate to capitate hairs, the longest of which are less than half the greatest diameter of the femur. First and second tibiae without conspicuous capitate hairs, hind tibiae with 0–4 fairly conspicuous capitate hairs. Tarsi normal, first tarsal joints with 5 hairs.

Measurements of one specimen : Length of body (including cauda) 1·27 mm., breadth of body 0·58 mm., antenna 1·20 mm., cornicles 0·35 mm., cauda 0·10 mm., width of head 0·26 mm., body hairs 0·05–0·06 mm., antennal segments $\frac{0{\cdot}07}{\text{I}}$; $\frac{0{\cdot}06}{\text{II}}$; $\frac{0{\cdot}27}{\text{III}}$; $\frac{0{\cdot}18}{\text{IV}}$; $\frac{0{\cdot}18}{\text{V}}$; $\frac{0{\cdot}09 + 0{\cdot}35}{\text{VI}}$ mm. No secondary sensoria.

Alate viviparous female.—Colour of living specimen : Head and thoracic lobes black with a pale green band behind the head. Abdomen pale green with a large dusky median patch dorsally on segments 2, 3, 4, 5 and 6. This patch just includes the pleural tubercles laterally and the dorsal transverse bars on 2 and 6 may be separated from the remainder. There are three lateral dusky patches in front of each cornicle. Ventral surface pale green except for thoracic lobes, which are black. Antenna very dark, almost black except for

base of III and processus terminalis, which is lighter. Legs very dark except for bases of femora and tibiae, which are pale green. Cornicles and cauda pale like body. Tip of rostrum black. Wing veins dusky, stigma pale.

Macerated specimen: Body oval, markings like living specimen. Hair-bearing tubercles absent on thorax and much reduced on abdomen. Capitate hairs less conspicuous than in apterous viviparous female but longer than those on alate *P. potentillae* and *P. tetrarhodus*. Each spinal tubercle generally has one long capitate hair and one short one. Pleural and marginal hairs are inconspicuous and occur singly. Chaetotaxy of head like *P. tetrarhodus*. Antennae (fig. 9) generally a little longer than body. I and II smooth, with hairs as in apterous viviparous female. III slightly imbricated with not more than 3 small capitate hairs and 19 to 36 secondary sensoria. IV, V and VI strongly imbricated and without capitate hairs. IV with 4–10 secondary sensoria. Cornicles and cauda as in apterous viviparous female. Anal plate spiny with 10–11 long non-capitate hairs. Genital plate with about 10 moderately long rather blunt hairs. Legs like apterous viviparous female but almost devoid of capitate hairs—one inconspicuous capitate hair on hind tibia. Wing venation normal.

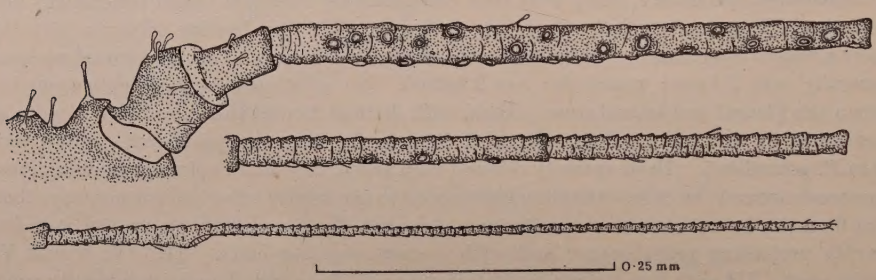

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Fig. 9.—Antenna of *P. fragariae* Theob., alate viv. ♀.

Measurements of one specimen: Length of body (including cauda) 1·76 mm., breadth of body 0·74 mm., antenna 1·81 mm., cornicles 0·32 mm., cauda 0·13 mm., wing span 5·6 mm., antennal segments $\frac{0{\cdot}08}{\text{I}}$; $\frac{0{\cdot}07}{\text{II}}$; $\frac{0{\cdot}50}{\text{III}}$; $\frac{0{\cdot}25}{\text{IV}}$; $\frac{0{\cdot}25}{\text{V}}$; $\frac{0{\cdot}13+0{\cdot}53}{\text{VI}}$ mm. Secondary sensoria 34 and 34 on III, 7 and 8 on IV.

Apterous oviparous female.—Colour of living specimen: At first like apterous viviparous female but when full of eggs it is readily distinguished by its lemon-yellow colour and shiny appearance due to the eggs showing through the integument.

Macerated specimen: Like apterous viviparous female but with considerably shorter antennae and with less conspicuous capitate hairs on antennae and legs. Spinal tubercles bearing 2 hairs occur from the 2nd thoracic to the 7th abdominal segment. Cornicles slightly but distinctly curved inwards. Hind tibiae slightly swollen with 28–45 pseudosensoria on basal $\frac{2}{3}$. An individual may contain up to 6 eggs and when these are fully developed the body is very swollen.

Measurements of one specimen: Length of body (including cauda) 1·32 mm., breadth of body 0·60 mm., antenna 1·13 mm., cornicle 0·29 mm., cauda 0·11 mm., antennal segments $\frac{0{\cdot}07}{\text{I}}$; $\frac{0{\cdot}06}{\text{II}}$; $\frac{0{\cdot}22}{\text{III}}$; $\frac{0{\cdot}16}{\text{IV}}$; $\frac{0{\cdot}16}{\text{V}}$; $\frac{0{\cdot}09+0{\cdot}37}{\text{VI}}$ mm. No secondary sensoria.

Egg: 0·53 mm. × 0·23 mm. Yellow to pale orange when laid, gradually turning to a shining black in 2 to 3 weeks.

Apterous male.—Colour of living specimen: Head dusky, body with transverse rather variable dusky bands, paler in some specimens with the lateral parts slightly translucent.

The darker parts can be resolved into median dorsal bands on the 2nd and 3rd thoracic and the 1st and 8th abdominal segments just including the pleural tubercles laterally. Eyes very dark red. Antennae light to dark brown. Cornicles slightly dusky and translucent. Cauda and anal plate dusky. External genitalia dark. Tip of rostrum almost black. Legs dusky or light brown, the bases of femora, coxae, and trochanters generally the lightest parts.

Macerated specimen: Body narrow and slender, markings as in living specimen. Capitate hairs prominent. Spinal tubercles on the 2nd and 3rd thoracic and the 1st and 2nd abdominal segments with 2 (occasionally 3) capitate hairs. All other tubercles with one capitate hair. Antennae: I and II smooth with hairs as in apterous viviparous female but those on II not distinctly capitate. II imbricated, with 3–13 secondary sensoria and about 3 short blunt hairs. IV imbricated with 3–10 secondary sensoria and about 3 short inconspicuous hairs. V imbricated with 3–8 secondary sensoria. VI imbricated. Cornicles short, imbricated. Cauda spiny, short and conical, caudal hairs as in apterous viviparous female. Legs like alate viviparous female.

Measurements of one specimen: Length of body (including cauda) 0·79 mm., breadth of body 0·32 mm., antenna 0·99 mm., cornicle 0·19 mm., cauda 0·07 mm., antennal segments $\frac{0{\cdot}06}{\text{I}}$; $\frac{0{\cdot}05}{\text{II}}$; $\frac{0{\cdot}24}{\text{III}}$; $\frac{0{\cdot}15}{\text{IV}}$; $\frac{0{\cdot}15}{\text{V}}$; $\frac{0{\cdot}08 + 0{\cdot}26}{\text{VI}}$ mm. Secondary sensoria, 12 and 10 on III, 6 and 4 on IV, 6 and 4 on V.

Biology: Lives all the year round on cultivated strawberries, along the veins on the undersides of leaves, and frequently swarms on the unopened and very young leaves. Unless winter conditions are very severe, apterae may be found all the year round. Alatae occur in May and June and a few in late autumn. Under glasshouse conditions sexuales are produced from November until March. Eggs were also found during this period but none of these hatched. According to Hodson (1937) the fundatrix is "apparently identical with the common asexual form." There are, however, likely to be small differences as in *P. potentillae* Wlk. Only on one occasion has an oviparous female been found out of doors by the authors; eggs which appeared to be those of *P. fragariae* were also found. Economically the species is of great importance as a vector of virus diseases and its biology has been studied in detail by Massee, Greenslade, and Duarte (1937), Hodson (1937), and Thomas and Jacob (1940). In addition to strawberries it has been shown that the species will live readily on *Fragariae vesca* L., *F. moschata* Duch., *Potentilla anserina* L., *P. sterilis* Gaercke, and *Rosa* spp.

V. Synonymy of *P. Fragariae* Theob.

In 1901 Cockerell in America described as *Myzus fragaefolii* a plant louse injuring strawberry plants. In 1912 Theobald described an aphis off strawberries in this country as *Myzus fragariae*; he later called it *Capitophorus fragariae* and the species is now referred to the genus *Pentatrichopus*. Davidson (1914) in America described sexuales of an aphis which he found on wild strawberries as *C. fragaefolii* Ckll. It is not clear from Davidson's account what plant he collected these sexuales on, but it reads as if he did not refer to cultivated strawberries.

Hottes and Frison (1931), Börner (1932), and Hodson (1937) have summarised their views regarding the synonymy of these species. Hottes and Frison conclude that *fragaefolii* Ckll. is the correct name since American material was identified by Theobald as *fragariae* Theob. Hodson states that certain specimens of *P. fragariae* Theob. from Europe have been identified as *C. fragaefolii* Ckll., by Dr. P. W. Mason of the U.S. Bureau of Entomology,

Washington. Hodson, however, concluded that *fragaefolii* Ckll. and *fragariae* Theob. are probably two different species. The American males are most conspicuously different owing to their possession of wings, but the oviparous females are also very different. Hodson does not discuss Ris Lambers' (1933) statement that both *P. fragaefolii* Ckll., and *P. fragariae* Theob. are synonyms of *P. potentillae* Wlk., a view that has subsequently been accepted by a number of American workers. Ris Lambers, however, now agrees with us that *P. potentillae* Wlk. is distinct from the species described in the present paper as *P. fragariae* Theob. Balachowsky and Mesnil (1935) describe and figure *P. fragaefolii* Ckll. Their figure of an alata shows no median dorsal dark patch and both the alata and aptera are drawn with 6 caudal hairs. Their discussion on synonymy follows closely that of Hottes and Frison (1931).

TABLE III.

Comparison of apterous viviparous females of American species (b) with *P. fragariae* Theob. and *P. potentillae* Wlk. (L. = Light form, D. = Dark form.)

Character	*P. fragariae* Theob.	American species (b)		*P. potentillae* Wlk.
Hairs on first tarsal joint.	5 easily seen.	5. Lateral ones shorter than in British species, L. & D.		5 easily seen.
Frontal tubercles.	Fairly prominent.	Very prominent, L. & D.		Very prominent.
Body hairs.	0·05 mm. No additional hairs between marginal and pleural rows.	0·04 mm. Additional hairs present between marginal and pleural rows.		0·05 mm. Additional hairs present between marginal and pleural rows.
Spinal tubercles.	A number with one hair.	Nearly all with two hairs, L. & D.		Generally all with two hairs.
Antennal and tibial hairs.	Few in number and rather short.	Like *P. fragariae*, L. & D.		Larger, more numerous and more conspicuous.
Head nodules.	Very few on base of antenna.	Confined to head, L. Some on base of antenna, D.		Many on base of antenna.
Hairs on trochanter.	Non-capitate.	Non-capitate, L. & D.		At least one capitate hair on each.
		L.	D.	
Hair : Body .	1 : 23 to 1 : 33	1 : 43	1 : 38	1 : 33 to 1 : 38
Hair : III [2] .	1 : 5⅕ to 1 : 6⅔	1 : 10½	1 : 10½	1 : 7⅖ to 1 : 9
Hair : Head [3] .	1 : 4⅕ to 1 : 5⅔	1 : 6	1 : 7	1 : 5⅕ to 1 : 7
Hair : Corn. .	1 : 6⅔ to 1 : 8	1 : 10	1 : 9	1 : 8 to 1 : 9
Hair : Cauda .	1 : 2 to 1 : 2⅔	1 : 4	1 : 3½	1 : 2⅔ to 1 : 3⅗
Head : III .	1 : 1 to 1 : 1¼	1 : 1⅗	1 : 1⅗	1 : 1¼ to 1 : 1⅔
Cornicle : III .	1 : 9/11 to 1 : 11/13	1 : 1	1 : 1⅙	1 : 1

[2] III = 3rd segment of antenna.
[3] Head = width of head immediately in front of eyes.

We have examined a number of slides of American and Canadian aphides of the genus *Pentatrichopus*, mainly identified as *P. fragaefolii* Ckll. The

material appears to contain two distinct species :—(a) apterous viviparous females which are indistinguishable from *P. fragariae* Theob., taken on *Potentilla* sp. and *Fragaria* sp.; (b) apterous and alate viviparous females which on close examination are seen to differ markedly from *P. fragariae* Theob., taken on wild and cultivated strawberries, *Potentilla monspeliensis* and *Rosa* spp. They also appear to be quite distinct from *P. potentillae* Wlk.

In addition, one slide of alate males and oviparous females taken on *Potentilla* sp. has been examined. Apart from the presence of wings on the males, both the males and females differ considerably from those of *P. fragariae* Theob. These may possibly be the sexuales of (b) but until breeding experiments have been carried out it is impossible to arrive at a definite conclusion.

A comparison of the American species (b) (light and dark forms) with *P. fragariae* Theob. and *P. potentillae* Wlk. is made in Table III.

The evidence suggests that either there is one species in America being identified as *P. fragaefolii* Ckll. which exhibits a wide variation of morphological characters, or that there are two species present one of which is indistinguishable from *P. fragariae* Theob. The morphological characters are so distinct that it is more likely that there are two species. If this proves to be true and Cockerell originally described the species which is identical with *P. fragariae*, then this aphis should be called *P. fragaefolii* Ckll., and *P. fragariae* should be renamed. On the other hand, if Cockerell described the species which differs from *P. fragariae* then Theobald's name should stand. Cockerell's type specimens will have to be very critically examined and considerably more breeding work will have to be done before a definite answer to this question can be given.

That *P. fragaefolii* Ckll. is synonymous with *P. potentillae* Wlk. appears to be most unlikely because the latter seems to live exclusively on *Potentilla anserina* L. (*vide* Thomas and Jacob 1939), and there are big morphological differences between all forms.

We are very much indebted to the following workers for the loan of slides : Professor E. O. Essig, Dr. P. W. Mason, Dr. B. D. Burks, Dr. A. Gibson and Mr. W. E. H. Hodson. We are also indebted to Dr. D. Hille Ris Lambers for aid with identifications in the early stages of the work.

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THE CLASSIFICATION OF THE GENUS *MISCHOCYTTARUS* SAUSSURE (HYMENOPT., VESPIDAE)

By O. W. Richards, M.A., D.Sc., F.R.E.S.

I have been engaged for some time on a revision of this large genus but it is unlikely that the work can be completed in the near future. Meanwhile, I believe that a statement of my views on its natural subdivisions would be useful to other workers who are describing new species. This statement can conveniently take the form of a key to the subgenera and species-groups. Four new species whose characters are referred to are also described.

Key to the subgenera and species-groups of *Mischocyttarus* Sauss.

1. Fore and mid femur with distinct ventral suture near proximal articulation, cutting off a small ring. Proximal inner articulation of fore coxa not or little reflexed into a flange. Large species. Clypeus distinctly longer than broad. Tentorial pits rarely much closer to eyes than to antennal sockets. POL : OOL = $\frac{1}{4}$–$\frac{1}{2}$. Occiput not margined. Anterior margin of pronotum little raised, not preceded by a furrow, lateral fovea present. Anterior margin of proepisternum little raised. Sculpture of mesopleuron always very weak. Dorsal division of metapleuron acutely produced ventrally. Abdominal tergite 1 with spiracular ratio (prespiracular part : postspiracular part) between $\frac{1}{2}$ and $\frac{3}{4}$. Subg. *Mischocyttarus* Saussure [1853]. Genotype. *Zethus labiatus* Fabricius [1805] by designation of Ashmead, 1902 . . . . . 2.

–. Fore femur without, mid femur rarely with traces of ventral suture near proximal articulation (never a real suture, only position of one indicated by lack of dark pigment). Proximal inner articulation of fore coxa reflected, forming a flange which is usually large. Species often much smaller . . . . . 3.

2. Abdominal tergite 1 unusually long and narrow, emargination at end of sternite twice as wide as deep. Mandibles with proximal half not ventrally sharp edged. Hind ocelli separated by about their diameter. Pronotal keel rarely distinctly sharp. Malar space half as long as width of antennal socket. Inner lobe of hind tarsal segment 3 either considerably or scarcely longer than outer lobe of 4. ♂ antenna with segment 13 two and a half times as long as broad, shorter than 11 + 12, segments somewhat flattened and shining beneath. ♂ mandible with three teeth, sometimes with traces of a fourth (dorsal) one. Membranous lobe of gonolacinia short and broad, teeth on parameres continued right up to median ventral hook. Includes :—*M. drewseni* Saussure, 1857, *M. smithii* Saussure [1853], *M. tomentosus* Zikán, 1935, *M. labiatus* (Fabricius [1805]), *M. melanarius* (Cameron, 1906), *M. rotundicollis* (Cameron, 1912) = *M. gracilis* Zikán, 1935, **syn. n.** Group of *M. labiatus* (Fabricius [1805]).

–. Abdominal tergite 1 not very long and narrow, emargination at end of sternite four times as wide as deep. Mandibles with proximal half ventrally sharp-edged. Hind ocelli separated by less than their diameter. Pronotal keel sharp throughout. Malar space three-quarters as long as width of antennal socket. Inner lobe of hind tarsal segment 3 a little longer than outer lobe of 4. ♂ antenna with segment 13 three and a half times as long as broad, segments with broad shining ventral areas. ♂ mandible with four teeth. Membranous lobe of gonolacinia long and finger-shaped, teeth on parameres ending well before median

ventral hook. Includes :—*M. carbonarius* (Saussure [1854]), *M. flavicans* (Fabricius [1805]), *M. duckei* (du Buysson, 1908). Group of *M. flavicans* (Fabricius [1805]).

3. Pronotum with lateral fovea (except in a few specimens of *M. injucundus* (Sauss.) and *M. tolensis* sp. n. which have occiput margined, clypeus distinctly broader than long, anterior margin of proepisternum strongly reflexed and mesopleuron more or less strongly punctured). Clypeus as long as broad or broader, usually in contact with eyes for only a short distance, tentorial pits usually equidistant from eyes and antennal sockets. Spiracular ratio usually about 1 ($\frac{5}{4}$–$\frac{4}{5}$). ♂ genitalia with membranous lobe of gonolacinia long and finger-shaped. Subg. *Kappa* Saussure [1854]. Genotype. *Polybia injucunda* Saussure [1854] by designation of Bequaert, 1932 . . . . . 4.

–. Pronotum with no lateral fovea (except a very minute one in *M. foveatus* sp. n., which has tentorial pits much closer to eyes than to antennal sockets, eyes in contact with clypeus for a long distance, clypeus longer than broad, central propodeal furrow very weak and hind claws hardly asymmetrical). Clypeus usually longer, sometimes as long as broad, usually in contact with eyes for a long distance, tentorial pits usually considerably closer to eyes than to antennal sockets. Spiracular ratio usually clearly less than 1. ♂ genitalia with membranous lobe of gonolacinia broad, often short. ♂ antenna always more or less distinctly modified . . . . . 7.

4. Anterior margin of proepisternum strongly raised and reflexed. Occiput usually margined, at any rate in centre (except *M. immarginatus* Richards, 1940). Keel of pronotum strong but widely interrupted in centre. Malar space $\frac{1}{4}$–$\frac{1}{2}$ as long as width of antennal sockets. Clypeus 1–1$\frac{1}{3}$ times as broad as long. POL : OOL = $\frac{1}{2}$–1. Posterior ocelli separated by two and a half diameters. Anterior margin of pronotum strongly raised, preceded by furrow whose posterior margin is obtuse or at most a sharp right angle. Dorsal division of metapleuron usually subacutely produced ventrally, more rarely obtuse. Inner lobe of hind tarsal segment 3 much longer than outer lobe of 4. Central furrow of propodeum usually rather strong. Sculpture of mesopleuron strong, usually with distinct punctures. Colour usually mainly black. ♂ with three mandibular teeth, antenna with distal segments elongate, most of intermediate segments with shining areas beneath. Includes :—*M. ater* (Olivier, 1791), *M. frontalis* (Fox, 1898), *M. tapuya* (Schulz, 1905), *M. pseudomimetica* (Schulz, 1903), *M. latior* (Fox, 1898), *M. immarginatus* Richards, 1940, *M. metathoracicus* (Saussure [1854]), *M. injucundus* (Saussure [1854]), *M. fitzgeraldi* Bequaert, 1938, *M. tolensis* sp. n. Group of *M. ater* (Olivier, 1791).

–. Anterior margin of proepisternum little raised or reflexed. Posterior ocelli separated by two diameters or less. Occiput not margined. Pronotal keel usually much more obtuse. ♂ (not known in group of *M. heliconius* sp. n.) with four mandibular teeth, antennal segments not or very indistinctly shining beneath . . . . . 5.

5. Mesopleuron with no evident sculpture. Dorsal division of metapleuron subacutely produced ventrally. Keel of pronotum rather strong, sharp, somewhat convex anteriorly. Malar space about $\frac{1}{3}$ as long as width of antennal socket. Clypeus as long as broad. POL : OOL = $\frac{1}{3}$. Anterior margin of pronotum strongly raised, preceded by a furrow whose posterior margin is obtuse. Inner lobe of segment 3 of hind tarsi much longer than outer lobe of segment 4. Central furrow of propodeum not very strong. ♂ unknown. Includes one other undescribed species. Group of *M. heliconius* sp. n.

–. Mesopleuron with conspicuous granulate or punctate sculpture. Dorsal division of metapleuron obtuse ventrally. Keel of pronotum rarely so strong or so sharp, usually straight . . . . . 6.

6. Segment 3 of mid tarsi little asymmetrical and inner lobe of segment 3 of hind tarsi little longer than outer lobe of segment 4 (except *M. paraguayensis* Zikán, 1935). ♂ antenna with at least segment 13 elongate. Malar space often half as long as width of antennal socket or longer. Clypeus broader than long. Central furrow of propodeum often strong. ♂ of *M. pallidipectus* (Smith, 1857) often has one spur of mid tibia reduced or absent. Includes :—*M. extinctus* Zikán, 1935, *M. bruneri* Bequaert and Salt, 1931, *M. flavitarsis* (Saussure [1854]), *M. pallidipectus* (Smith, 1857), *M. marginatus* (Fox, 1898), *M. chapadae* (Fox, 1898), *M. wagneri* (du Buysson, 1908) = *M. pedunculatus* Zikán, 1935, **syn. n.**, *M. cassununga* R. von Ihering, 1903, *M. paraguayensis* Zikán, 1935, *M. confirmatus* Zikán, 1935. Group of *M. flavitarsis* (Saussure [1854]).

–. Segment 3 of mid tarsi strongly asymmetrical and inner lobe of segment 3 of hind tarsi much longer than outer lobe of segment 4. ♂ antenna with segment 13 hardly longer than 12. Malar space not more than $\frac{1}{3}$ as long as width of antennal socket. Clypeus about as long as broad. Central furrow of propodeum weak. Includes :—*M. phthisicus* (Fabricius, 1793), *M. cubensis* (Saussure [1854]), *M. basimacula* (Cameron, 1906), *M. alfkenii* (Ducke, 1904). Group of *M. cubensis* (Saussure [1854]).

7. Keel of pronotum very strong, lobate at sides, anteriorly strongly concave. Occiput strongly margined throughout. Considerable areas on the thorax with large separate punctures. POL : OOL = 1–2. Hind ocelli separated by $1\frac{2}{3}$–$3\frac{1}{2}$ diameters. (Malar space extremely short. Clypeus considerably longer than broad. Anterior margin of pronotum strongly raised, preceded by furrow the posterior margin of which may be subacute but is not laminate. Dorsal division of metapleuron obtuse below. Hind tarsus with inner lobe of segment 3 little longer than outer lobe of segment 4. Mid tibia often with only one spur. ♂ not seen.) Includes :—*M. filiformis* (Saussure [1854]), *M. punctatus* (Ducke, 1904), *M. buyssoni* (Ducke, 1906), *M. cristatus* Zikán, 1935. Subgenus *Omega* Saussure [1854]. Monobasic, type *Polybia filiformis* Saussure [1854].

–. Keel of pronotum very rarely as strong and at same anteriorly concave; if approaching this condition, then occiput not margined. Thorax never with large punctures. POL : OOL at most 2 : 3. Propodeal furrow always very weak. Mid tibia always with two spurs. ♂ antennal segments with no shining areas beneath . . . . . 8.

8. Segment 3 of mid tarsus almost symmetrical. Inner lobe of segment 3 of hind tarsus not longer than outer lobe of segment 4, claws hardly asymmetrical. Malar space at most one-quarter as long as width of antennal socket. Occiput not margined. POL : OOL = $\frac{1}{3}$–$\frac{1}{2}$. Posterior ocelli separated by less than their diameter. Anterior margin of pronotum little raised, not preceded by a furrow, fovea absent or (one species) minute, keel weak, gradually evanescent at sides, straight or anteriorly a little convex. Anterior margin of proepisternum little raised or reflexed. Dorsal division of metapleuron acutely or more or less obtusely produced below. Mesopleuron very finely sculptured, more or less shining. ♂ mandible with four teeth. ♂ antenna with segments 10–13 elongate, subspirally rolled. ♂ paramere unusually broad, ventral hook very long, directed laterally, at right angles to long axis of paramere. Includes :—*M. lecointei* (Ducke, 1904), *M. metoecus* Richards, 1940, *M. foveatus* sp. n. **Monogynoecus** subg. n. Type *M. lecointei* (Ducke, 1904).

–. Segment 3 of mid tarsus distinctly asymmetrical. Inner lobe of segment 3 of hind tarsus much longer than outer lobe of segment 4, claws strongly asymmetrical. Pronotum never with fovea. ♂ mandible with three teeth. ♂ paramere of normal narrow type with small ventral teeth and ventral hook shorter, blunter and directed ventrally along axis. Subg. *Megacanthopus* Ducke, 1904. Genotype. *M. collaris* Ducke, 1904, by designation of Bequaert, 1932 . . . . . 9.

9. Anterior margin of pronotum very strongly raised and reflexed, ending in a hook ventrally, preceded by a broad furrow in which there are two or three large hyaline depressions. Malar space one-quarter as long as width of antennal socket. Clypeus as broad as long. POL : OOL = $\frac{1}{2}$. Hind ocelli separated by $1\frac{1}{2}$–2 diameters (♀) or $1\frac{1}{4}$–$1\frac{1}{2}$ (♂). Occiput not margined. Pronotal keel very strong, anteriorly convex. Anterior margin of proepisternum considerably raised and reflexed. Dorsal division of metapleuron acutely produced below. Mesopleuron more or less granulate, rarely a little shining. ♂ antenna with segments 10–13 elongate, subspirally rolled, 13 flattened and truncate. Includes :— *M. collaris* (Ducke, 1904), *M. superus* Richards, 1940, *M. collarellus* Richards, 1940. Group of *M. collaris* (Ducke).

–. Anterior margin of pronotum less strongly raised and reflexed, not ending ventrally in a hook, without depressions in the furrow. Posterior ocelli separated by rather more or less than their diameter. ♂ antenna with segments 10–13 elongate, subspirally rolled, 13 cylindrical, not truncate . 10.

10. Anterior margin of pronotum more or less strongly raised, preceded by no or by a weak furrow whose posterior margin is obtuse. Malar space one-quarter as long as width of antennal socket. Clypeus somewhat longer than broad. POL : OOL = $\frac{1}{2}$–$\frac{2}{3}$. Pronotal keel more or less strong, straight . . . . . 11.

–. Anterior margin of pronotum strongly raised, preceded by a furrow whose posterior margin is acute, usually laminately produced. Sculpture of mesopleuron usually very fine. Clypeus about as long as broad. Occiput never margined in centre. Pronotal keel straight or more or less concave anteriorly . . . . . 12.

11. Central part of occiput margined. Mesopleuron with hardly visible sculpture. Proepisternum with anterior margin reflexed or not. Dorsal division of metapleuron ventrally obtusely or subacutely produced. Includes one other undescribed species. Group of *M. prominulus* sp. n.

–. Occiput not margined. Mesopleuron with rather strong granulate sculpture. Proepisternum with anterior margin rather strongly raised and reflexed. Dorsal division of metapleuron ventrally acute. Includes :— *M. surinamensis* (Saussure [1854]), *M. confusus* Zikán, 1935, *M. garbei* Zikán, 1935. Group of *M. surinamensis* (Saussure [1854]).

12. Occiput quite strongly margined at sides though not in centre. Mesopleuron moderately granulate. Larger claw of hind tarsus considerably larger and blunter than smaller one. Posterior ocelli separated by one and a half diameters. Pronotal keel with lateral extremities somewhat reflexed. POL : OOL = $\frac{1}{3}$–$\frac{1}{2}$. Anterior margin of proepisternum narrowly reflexed. Dorsal division of metapleuron ventrally acutely produced. Ocellar region almost entirely black. Includes one species. Group of *M. iheringi* Zikán, 1935.

–. Occiput nowhere margined. Mesopleuron almost quite smooth . . . . 13.

13. Larger claw of hind tarsus somewhat longer but not much blunter than smaller one. Posterior ocelli separated by one and a half diameters. Pronotal keel with lateral extremities somewhat lobate and reflexed posteriorly. POL : OOL = $\frac{1}{2}$–$\frac{2}{3}$. Anterior margin of proepisternum rather strongly raised and reflexed. Dorsal division of metapleuron

subacutely produced ventrally. Dark mark surrounding ocelli without lateral " wings ". Includes one species. Group of *M. cerberus* Ducke, 1918.

–. Larger claw of hind tarsus much larger, blunter and more truncate than the smaller one. Posterior ocelli separated by a little more or less than one diameter. Pronotal keel with lateral extremities not lobate. POL : OOL = $\frac{1}{3}$–$\frac{1}{2}$. Anterior margin of proepisternum moderately raised, little reflexed. Dorsal division of metapleuron ventrally obtusely or acutely produced. Dark mark surrounding ocelli usually with lateral " wings ". Includes :—*M. artifex* (Ducke, 1914), *M. oecothrix* Richards, 1940, *M. synoecus* Richards, 1940. Group of *M. artifex* (Ducke, 1914).

Descriptions of New Species.

Mischocyttarus tolensis sp. n.

Belongs to the subgenus *Kappa* Saussure, group of *M. ater* (Oliv.). It is closely allied to *M. fitzgeraldi* Bequaert, 1938, which has the thorax more strongly punctured, the postscutellum and the propodeum resembling the mesonotum in being covered with moderately strong punctures separated by half their diameter; abdominal tergite 1 is somewhat shorter and broader in the new species.

♀. Black; mandibles, ventral half or whole of clypeus, part of antenna beneath distally, articulations of all legs and fore tibia anteriorly, dark ferruginous; inner orbital streak from clypeus to centre of eye-emargination, streak near top of external orbit, streak on postscutellum, spots on each side of propodeum posteriorly, dorsal surface of segment 5 of front tarsus, some marks on mid and hind coxa and very small distal marks on mid and hind femora pale yellow. Tegula brown. Wing fuscous, especially along costa. Length (H. + Th. + T1. + T2.) 9·0–10·0 mm.; length of fore-wing 8·0–10·0 mm.; hamuli 10–11.

Abdominal tergite 1 a very little shorter than hind femur, anteriorly parallel-sided, then regularly diverging. Propodeum with central furrow separated by one-third its length from postscutellum, anterior horizontal area little developed, surface with close fine punctures and scattered larger ones, separated by 3–4 diameters. Malar space one-quarter as long as width of antennal socket. Occiput with distinct marginal keel. Pronotal lateral fovea present or absent.

Type. Panama : Tolé, ♀ (*Champion*) (Godman-Salvin coll., Brit. Mus.). Paratypes. Panama : Canal Zone, Barro Colorado Is., 2–3.vii.1924, ♀ (*N. Banks*), Alhajuelo, 8.iv.1911, ♀ (*A. Busck*).

The paratypes are in the collection of Dr. J. Bequaert.

Mischocyttarus heliconius sp. n.

Belongs to the subgenus *Kappa* Saussure, in which it forms a distinct species-group, not being closely allied to any described species. The resemblance of the female in some characters to that sex in *M. flavicans* (Fab.) may not imply very close relationship; unfortunately, the male of the new species is still unknown.

♀. Head black; clypeus (except extreme ventral margin), two small spots between antennae, inner orbits narrowly to posterior limit of eyes, outer orbits narrowly, whitish-yellow; mandibles and antennae testaceous, dorsal margin of former and dorsal side of latter, black. Thorax brownish-black, most of pronotum and propodeum more testaceous; pronotal keel, anterior margin of scutellum and its axillae, anterior margin of postscutellum and its lateral lobes, large patches on each side of black propodeal furrow, spot at top of prepectus, spot at postero-ventral corner of mesopleuron, pale yellow. Fore leg brownish-

black, all articulations, tibia beneath, tarsus except proximal two-thirds of segment 1, testaceous, tibia with distal dorsal yellow spot; mid leg testaceous, coxa with ventral and dorsal black and an external dorsal yellow one, femur with dorsal and ventral black stripes, tibia with dorsal black stripe and distal pale yellow mark; hind leg testaceous, coxa with dorsal black stripes and yellow stripes, trochanter, femur and tibia and proximal two-thirds of tarsal segment 1 with black dorsal stripe, tibia with a pale yellow distal mark. Abdomen testaceous, indefinite band just before posterior margin of tergite 1, tergite 2 (except anterior third), whole of tergites 3–6, narrow posterior band of sternite 2, whole of sternites 3–6, black. Tegula testaceous. Wing moderately infuscate or somewhat yellowish. Length (H. + Th. + T1. + T2.) 10·5 mm.; length of fore-wing 12·0–12·5 mm.; hamuli 9–11.

Sculpture of thorax hardly visible. Malar space between one-quarter and one-third as long as width of antennal socket. Abdominal tergite 1 as long as hind femur, parallel-sided to spiracles, thence strongly campanuliform, posterior four times as broad as anterior margin. Clypeus only a little longer than broad, ventral margin moderately strongly produced, not bidentate.

Type. British Guiana: Essequibo R., Moraballi Creek, high forest, nest 2461, 20.ix.1929, ♀ (*Oxford Univ. Exped.*). Paratypes. British Guiana: same place, 21.ix.1929, ♀ (*Oxford Univ. Exped.*); Potaro R., trail from Tukeit to Kaieteur Savannah, nest 151, 1.ix.1937, ♀ (*Richards* and *Smart*).

The Moraballi paratype has been deposited in Dr. J. Bequaert's collection, the two other specimens in the British Museum.

Mischocyttarus prominulus sp. n.

Belongs to the subgenus *Megacanthopus* Ducke within which, together with one other undescribed species, it forms a distinct species-group.

♀♂. Yellow; antenna ferruginous, segments 1–2 more or less black dorsally; some variable markings on head, stripes on dorsal lobes of pronotum, one or three stripes on mesonotum, central furrow of propodeum, stripes on mid and hind coxa, some distal segments of mid and hind tarsus, centre of abdominal tergite 1, tergites 2–6, except posterior margins of 2–3, brownish to black. Tegula yellow with hyaline external spot; wing hyaline, costal cell hardly yellower. Length (H. + Th. + T1. + T2.) 7·5 mm.; length of fore-wing 7·0–8·0 mm.; hamuli 6–8.

Malar space hardly one-quarter as long as width of antennal socket. Clypeus (♀) ventrally angularly but not very strongly produced over its whole width, (♂) more rounded. Ocelli in equilateral triangle, separated by little more than their diameter, POL : OOL = nearly 1 : 2. Occiput weakly margined in centre. Thorax dull, very finely granulate. Pronotal keel rather strong, straight and continuous. Abdominal tergite 1 as long as hind femur, parallel-sided to spiracles, then expanding a little but becoming parallel again, posterior hardly twice as wide as anterior margin. ♂ antenna with segment 3 as long as 1 + 2, considerably longer than 4 + 5, 4–10 becoming gradually shorter and thicker, 4 one and a half times as long as broad, 10 just transverse, 11 and 12 a little longer than 10, 13 two and a half times as long as broad, a little longer than 5, antenna subspirally rolled, no segment shining or ciliate beneath.

Type. British Guiana: Mazaruni R., Kartabo, vii.1922, ♀ (*M. D. Haviland*) (Brit. Mus.). Allotype. Mazaruni Settlement, second growth forest, nest 75, 21.viii.1937, ♂ (*Richards* and *Smart*) (Brit. Mus.). Paratype. East Bolivia: 1.iii.1907, ♀ (Steinbach) (Universitäts Museum, Berlin) (dark markings rather reduced).

Mischocyttarus foveatus sp. n.

Belongs to the subgenus *Monogynoecus* **subgen. n.** and is separated from all species in that and allied subgenera in having a small pronotal fovea.

♀♂. Brownish-yellow with darker markings as in *M. lecointei* (Ducke, 1904) but more nebulous. Length (H. + Th. + T1. + T2.) 7·5–9·0 mm.; length of fore-wing 9·5–10·0 mm.; hamuli 7–9.

Structurally very similar to *M. lecointei* (Ducke) but ♀ clypeus tending to have ventral margin more rounded; pronotal keel similar or a little stronger centrally, pronotal fovea more or less indicated though very small and shallow: thorax duller. ♂ antennal segment 1 as thick as distance between sockets (not two-thirds as thick), segments 11–13 longer and thinner.

Type. British Guiana: Essequibo R., 1st falls, no. 4070, 14.x.1929, ♀ (*Oxford Univ. Exped.*) (Brit. Mus.). Allotype. British Guiana: North West District Issororo, vi.1915, ♂ (*G. E. Bodkin*) (Brit. Mus.). Paratypes. British Guiana: Essequibo R., 1st falls, no. 4044, 14.x.1929, 3 ♀♀, Island near Monkey Jump, no. 3800, 12.x.1929, ♀, Moraballi Creek, dark forest, no. 6241, 11.xi.1929, 2 ♀♀ (*Oxford Univ. Exped.*) (Brit. Mus.).

One paratype each will be deposited in Dr. J. Bequaert's and my collection.

GENOTYPE FIXATIONS IN HEMIPTERA HETEROPTERA

By W. E. China.

While engaged on a report on the generic names of British Heteroptera for the Royal Entomological Society, I have found that the genotypes of several genera have remained unfixed. I therefore cite the following species:—

1. **Palethrocoris** Kolenati 1845, *Melet. Ent.* **2**: 48, genotype *Coreus* (*Palethrocoris*) *disciger* Kolenati 1845.
2. **Hypnophilus** Douglas & Scott, 1865, *Brit. Hemipt.*: 208, genotype *Rhyparochromus micropterus* Curtis 1836.
3. **Megalonotus** Fieber 1860, *Europ. Hemipt.*: 47, genotype *Lygaeus chiragra* F. 1794.
4. **Orthosteira** Fieber 1844, *Ent. Mon.*: 46, genotype *Orthosteira cervina* Fieber 1844 = *Tingis carinata* Panzer 1806.
5. **Poecilta** Stål 1873, *Enum. Hemipt.* **3**: 108, genotype *Metastemma perpulchra* Stål 1855.
6. **Orthonotus** Stephens 1829, *Syst. Cat. Brit. Ins.*: 344, genotype *Capsus rufifrons* Fallen 1807.
7. **Hepa** Geoffroy 1762, *Hist. abrégée Ins.*: 479, genotype *Nepa cinerea* L. 1758.

Note.—Geoffroy figured (pl. 10, fig. 1) *Ranatra linearis* (L. 1758) but if this species were cited as genotype *Hepa* would replace the well-known *Ranatra* F. 1790, a very undesirable happening.

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Smith, A., 1936, New species of Coccidae, *Proc. R. ent. Soc. Lond.* (B) **6** : 301–306, pl. 1.

——. 1936, New species of Coccidae, *Trans. R. ent. Soc. Lond.* **84** : 901–936.

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TO BE HELD IN THE SOCIETY'S ROOMS

41, Queen's Gate, S.W.7

1941.

WEDNESDAY, October 1
,, November 5
,, December 3

1942.

,, January 21 (ANNUAL MEETING)
,, February 4

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